(No Model.) 2 Sheets—Sheet 1.

W. P. NORTON.

SCREW CUTTING ENGINE LATHE.

No. 519,924. Patented May 15, 1894.

Fig. 1

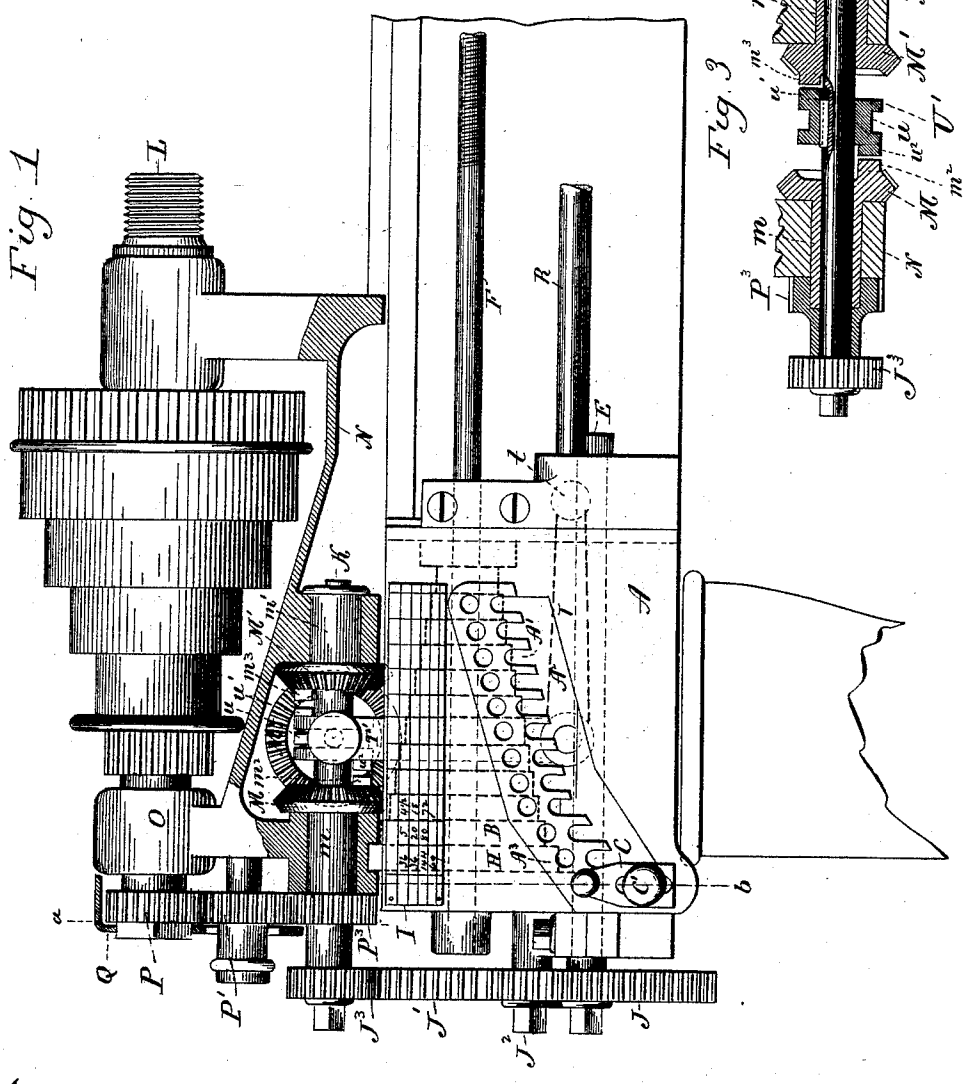


Fig. 3

Witnesses.
J. H. Shumway
Lillian D. Kelsey

Wendell P. Norton,
Inventor.
By atty's Earle & Seymour

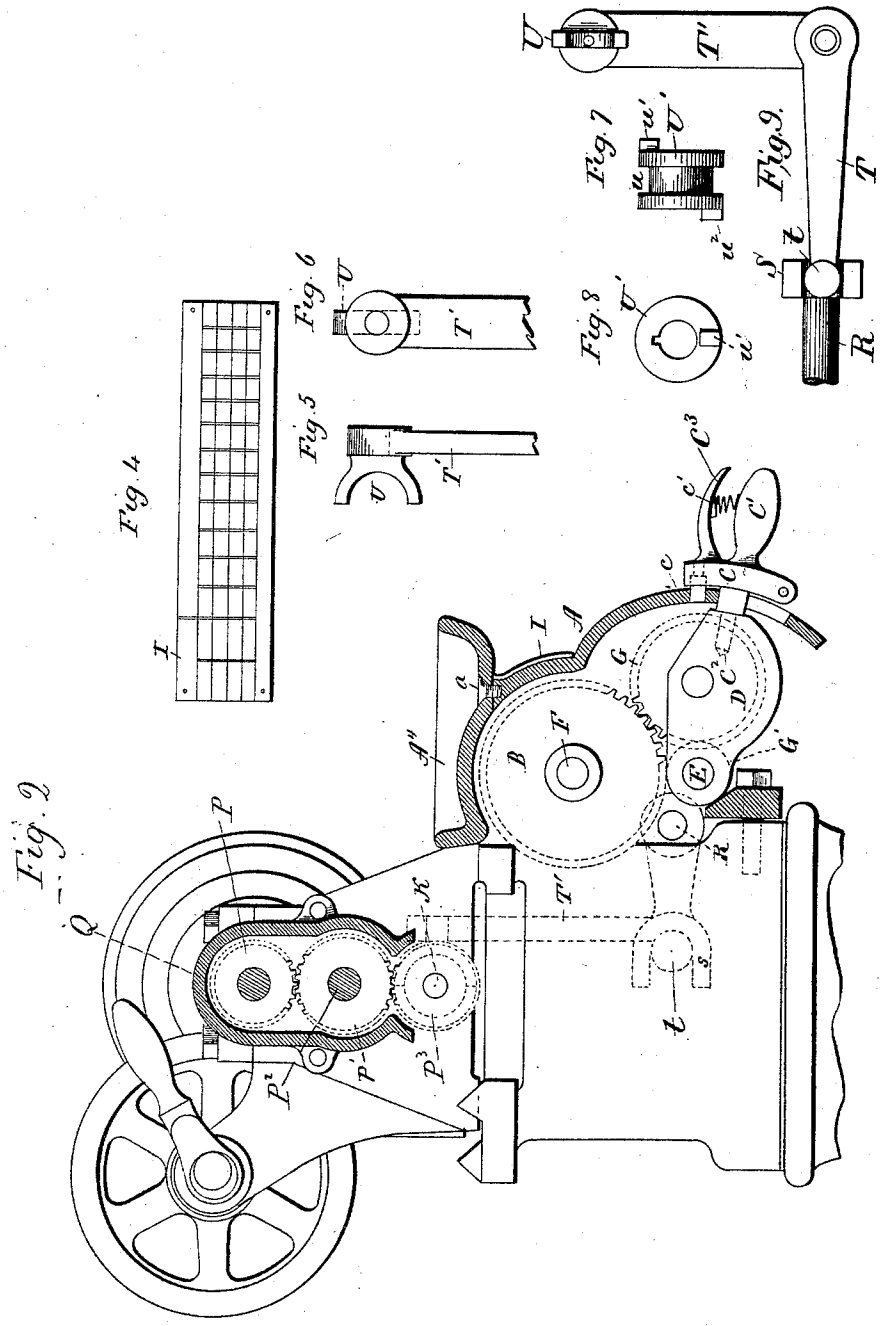
THE NATIONAL LITHOGRAPHING COMPANY,
WASHINGTON, D. C.

(No Model.) 2 Sheets—Sheet 2.

W. P. NORTON.

SCREW CUTTING ENGINE LATHE.

No. 519,924. Patented May 15, 1894.



Witnesses
J. H. Shumway
Lillian D. Kelsey.

Wendell P. Norton,
Inventor.
By Attys
Earle & Seymour

THE NATIONAL LITHOGRAPHING COMPANY.
WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

WENDELL PHILLIPS NORTON, OF TORRINGTON, CONNECTICUT, ASSIGNOR TO THE HENDEY MACHINE COMPANY, OF SAME PLACE.

SCREW-CUTTING ENGINE-LATHE.

SPECIFICATION forming part of Letters Patent No. 519,924, dated May 15, 1894.

Application filed May 15, 1893. Serial No. 474,265. (No model.)

To all whom it may concern:

Be it known that I, WENDELL PHILLIPS NORTON, of Torrington, in the county of Litchfield and State of Connecticut, have invented a new Improvement in Screw-Cutting Engine-Lathes; and I do hereby declare the following, when taken in connection with accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1, a broken view partly in front elevation and partly in section of a screw-cutting engine-lathe constructed in accordance with my invention; Fig. 2, a similar view partly in end elevation and partly in transverse section on the line *a—b* of the preceding figure; Fig. 3, a detached view partly in elevation and partly in section, showing the stud or shaft K, and the several gears associated therewith, as well as the clutch which is splined thereto; Fig. 4, a detached view of the index plate; Fig. 5, a broken view in side elevation of the upper member of the bell-crank lever showing the swiveled yoke carried thereby; Fig. 6, a view of the same part in front elevation; Fig. 7, a detached view in side elevation of the clutch; Fig. 8, a similar end view thereof; Fig. 9, a detached view in side elevation showing the bell-crank lever, the pivotal fork carried by the upper member thereof, the reversing-lever connected with the lower end thereof, and a portion of the reversing-rod to which the reversing-lever is rigidly secured.

My invention relates to an improvement in screw-cutting engine lathes, and more particularly to the device upon which United States Letters Patent No. 470,591 were granted to me under date of March 8, 1892, the object of my present invention being to produce a device of simple and comparatively cheap construction, having few parts, and not liable to derangement, durable, convenient in use, and adapted to a wide range of adjustment for varying the speed at which its feed-screw shaft or lead-screw is driven.

With these ends in view, my invention consists in a lathe of the character described, having certain details of construction and combination of parts as will be hereinafter described and pointed out in the claims.

In carrying out my invention, I construct the box or case A, which incloses the series of differential gears B, with an inclined series of deep, vertical notches A′, opening downward, and respectively arranged in alignment with the gears, and with a long inclined clearance space A^2, located below the said notches which open into it. The notches and space may be formed when the box is cast, or they may be cut therein subsequently. The said notches and space receive a shoulder C, formed upon the handle C′, the inner end of which is provided with a stud C^2, which enters a sliding lever D, suspended from a driving-shaft E, located within the box A, at a point below the feed-screw shaft or lead-screw F, upon which the gears B are mounted. An intermediate gear G, journaled upon a stud mounted in the lever D, meshes into a driving-pinion G′, mounted on the driving-shaft E, so as not only to rotate therewith, but also to be free to slide thereupon with the lever D, which, as above stated, is suspended from the said shaft. A series of holes A^3, formed in the box A, directly above and in aligment with the notches A′ aforesaid, are designed to receive a locking pin *c*, projecting inward from the upper end of a locking lever or latch C^3, pivoted to the handle C′, below the center thereof, and normally thrown inward by a spiral spring *c′*, interposed between its outer end and the said handle. The respective notches A′, are connected by a series of parallel vertical lines H, formed in or applied to the outer surface of the box, with the respective divisions of an index-plate I, formed independently of the box, and attached thereto at a point above the said slots, as plainly shown in Fig. 1 of the drawings. The graduations of the plate are arranged in a series of parallel columns extending transversely across it, each column constituting a division of the plate which is arranged horizontally upon the outer surface of the box. The function of the lines H, just mentioned, is simply to lead the eye from the notches to the respective divisions of the

plate. It will be readily understood that by moving the handle C′ through the clearance space A formed in the box, the intermediate gear G, may be brought into range with any one of the series of differential gears B, and that by lifting the handle into the right notch, the said intermediate gear may be meshed into any one of the said differential gears, being retained in position against lateral movement by the side walls of the slot, and against downward movement by the entrance of the pin *c*, of the locking lever C^3 into the locking-hole A^3 above the notch. It will be perceived that whereas the lathe shown and described in my prior patent employed a notched and graduated plate made independent of and applied to the box inclosing the series of differential gears, I now form the notches directly in the said box, and locate the graduations upon an index plate applied thereto.

My present construction is simple and cheap, and secures for my improved lathe a great range of adjustment, for while under my prior construction the interchangeable gears of the lathe could only be varied within the limits of the graduations on the plate, I am now enabled to interchange those gears indefinitely, by simply substituting one index-plate for another of different graduations, it being a simple matter to have a number of these index-plates, and to interchange them. The interchangeable gears referred to are the ordinary interchangeable gears of lathes of this class, and are sufficiently illustrated by a small gear J, mounted upon the projecting outer end of the driving-shaft E, a large gear J′, meshing into the gear J, and mounted upon a stud J^2, and a small gear J^3 fixed to the outer end of the stud or shaft K. The box or case A is furnished with a removable cover A^4, as clearly shown by Fig. 2 of the drawings, the said cover being secured in place by screws *a*. By removing this cover, access is afforded to the box for oiling the differential gears, and giving any of the parts within it thus made accessible, attention.

The second feature of my invention relates to the connection of the live spindle L, of the lathe, with the reversing gears M, M′ and M^2. It has been customary heretofore to form an opening in the upper wall of the head N of the lathe, and lead directly downward through the said opening from the spindle to the said reversing gears. The formation of such an opening is objectionable, for the reason that it weakens the head, and I therefore extend the spindle through the back-bearing O of the lathe, and go down on the outside of the said bearing, so to speak, and then lead into the head from the outer end thereof to the said reversing gears. Thereto I furnish the projecting end of the spindle with a small feed-gear P, which I call the first feed-gear, and provide a sliding intermediate gear P′, which is mounted on a stud P^2, parallel with and below the spindle. I also provide another feed-gear P^3, which I call the second feed-gear, this being secured to the outer end of a sleeve *m* encircling the stud or shaft K, and extending outward through the outer end of the head from the reversing gear M to which it is fixed. This second gear P^3 is meshed into by the intermediate sliding gear P′ before mentioned. It will be understood that by moving the intermediate sliding gear P′ inward, the reversing gears and hence the interchangeable gears and the lead-screws are cut out of action. A box or hood Q, inclosing the gears P and P′, and partially inclosing the gears P^3, protects the same, and prevents anything from being caught in them. The reversing rods of lathes of this class have generally been connected with the clutches co-operating with the reversing gears of the lathes, by means of complicated trains of gears, which under my invention I dispense with. I provide the reversing rod R of my improved lathe with an inwardly projecting lever S, which is rigidly secured at its outer end to it, the inner end of the said lever being constructed with a socket *s*, which receives a ball *t*, formed at the end of the lower member T, of a bell-crank lever, the upper member T′ whereof carries a swiveled fork U, normally standing in a vertical plane, and taking into a vertical groove *u*, formed in a reversing clutch U′, mounted upon the shaft or stud K, and connected therewith by a spline, which permits it to be longitudinally moved upon the said shaft, which rotates when it is rotated, the shaft having bearing in the sleeves *m* and *m′* of the reversing gears M and M′. Lugs u' u^2 projecting in opposite direction from the clutch U′, are arranged for engagement with lugs m^2 m^3 extending inwardly from the inner faces of the reversing gears M M′, which constantly rotate in opposite directions, the gear M being driven by the second feed-gear P^3, and driving the gear M′ in the opposite direction through the medium of the gear M^2, which is meshed into by both of the gears M M′. When the said bell-crank lever is operated for moving the clutch on the shaft K, toward the reversing gear M, the lug u^2 of the clutch will engage with the lug m^3 of the gear, whereby the shaft will be coupled with the gear and rotated in the direction in which the same is rotated. On the other hand when the bell-crank lever is operated so as to move the clutch U′ toward the gear M′, the lug u' of the clutch will engage with the lug m^3 of the gear M′, whereby the said shaft will be coupled with the said gear, and rotated in the opposite direction from which it was rotated when the clutch was in engagement with the gear M. The socket *s* and ball *t* above mentioned, form the respective members of a ball and socket joint, but the inwardly projecting lever S and the bell-crank lever may, if preferred, be constructed to be connected in some equivalent manner.

The use of levers, as above described, is not only simpler and cheaper than the prior con-

struction referred to, but is more responsive, as it avoids the lost motion incident to the use of gears.

I would have it understood that I do not limit myself to the exact construction herein shown and described, but hold myself at liberty to make such changes and alterations as fairly fall within the spirit and scope of my invention. I am aware, however, that it is not broadly new to connect the reversing-rod of an engine-lathe with the clutch of the reversing gears thereof by means of levers instead of gears, and I do not therefore claim that construction broadly.

I am also aware that it is not new to construct the box or case which incloses the differential gears of a screw-cutting engine-lathe with a series of notches corresponding in number and position to the gears to receive a sliding lever carrying an intermediate gear, and to provide an index to indicate with what slot the lever must be engaged to produce a certain speed in the action of the lathe. That construction is shown in my prior patent referred to at the beginning of this description, and I do not therefore claim such a construction broadly.

I am also aware that removable index-plates are not broadly new when employed to indicate the proper gears to be used to cut certain threads, and I do not claim that construction broadly.

Having fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a screw-cutting engine-lathe, the combination with the live spindle which is extended through the back-bearing of the lathe, of the head of the lathe, reversing gears located within the said head, a train of gears including a sliding gear connecting the projecting end of the spindle with one of the reversing gears through the outer end of the said head, a sliding clutch located within the said head for co-operation with the reversing gears therein, a lever extending into the said head, and connected with the said clutch for operating the same, a lead screw and interchangeable gears between the reversing gears and the lead screw, substantially as described.

2. In a screw-cutting engine-lathe, the combination with the back bearing thereof, of a live spindle extended rearward through the same, a head, reversing gears located within the same, a stud extending into the said head, and carrying two of the reversing gears, a train of gears between the projecting end of the spindle and the said reversing gears, one member of the said train being secured to a sleeve encircling the said stud, and connected with one of the reversing gears, and interchangeable gears, one member of which is fixed to the said stud, substantially as described.

3. In a screw-cutting engine-lathe, the combination with the reversing rod and lead-screw thereof, of a lever rigidly secured to and extending inwardly from the said rod, a bell-crank lever having its lower member connected with the said lever attached to the rod, reversing gears, including two gears driven in opposite directions and an intermediate gear meshing with both of the said gears a sliding clutch located between the oppositely driven reversing gears for alternate engagement therewith and connected with the upper member of the said bell-crank lever, a shaft or stud on which the said clutch is mounted, and a train between the said shaft and the lead-screw, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

WENDELL PHILLIPS NORTON.

Witnesses:
WILLIAM W. MERTZ,
WILLARD A. RORABACK.